IN THE CLAIMS

Please amend the claims as indicated below.

1. (Currently Amended) A fluidized-bed reactor comprising:

a chamber defining a hollow interior region and having a lower surface;

a first input for introducing a contaminated gas into the hollow interior region, the contaminated gas comprising at least one hydrocarbon contaminant;

a plurality of catalyst nanoparticles within the hollow interior region and located on the lower surface, wherein the catalyst nanoparticles have an average particle diameter of about 15 m to about 25 nm, and

a fluidizing input for introducing a fluidizing material into the hollow interior region, said fluidizing input having an outlet directed at the lower surface of the chamber such that the fluidizing material fluidizes at least a portion of the plurality of catalyst nanoparticles located at the lower surface of the chamber, and

the fluidized catalyst nanoparticles react with the contaminated gas to produce a decontaminated gas.

2. (Original) The fluidized-bed reactor of claim 1 wherein the catalyst nanoparticles are partially fluidized by the introduction of the contaminated gas through the first input.

3 (Original) The fluidized-bed reactor of claim 1 further comprising a port for the exit of the decontaminated gas out of the hollow interior region.

4. (Original) The fluidized-bed reactor of claim 3 further comprising a second input for introducing a backpressure pulse of gaseous material into the hollow interior region through the port.

5. (Currently Amended) The fluidized-bed reactor of claim 4 further comprising a gas permeable separation device in communication with both the port and the second input, wherein the exit of decontaminated gas from the hollow interior region through the gas permeable separation device causes catalyst nanoparticles to collect upon the gas permeable separation device and the entrance of the backpressure pulse into the hollow interior region displaces collected catalyst nanoparticles <u>and allows said collected catalyst nanoparticles to join the fluidized catalyst nanoparticles and continue reacting with contaminated gas within the hollow interior region</u>.

6. (Original) The reactor of claim 1, further comprising a humidifier in communication with the first input.

7. (Currently Amended) The reactor of claim 4 further comprising a device for synchronizing the function of the second input for introducing a backpressure pulse of gaseous material into the hollow interior region to function with ~~i~~at least one of the group comprising the first input for introducing a contaminated gas into the hollow interior region, the fluidizing input for introducing a fluidizing material into the hollow interior region and combinations thereof, wherein the device for synchronizing prevents the simultaneous introduction of at least one of the group comprising contaminated gas, fluidizing material, and combinations thereof with a backpressure pulse of gaseous material into the hollow interior region.

8. (Canceled)

9. (Previously Presented) The reactor of claim 1, wherein the catalyst nanoparticles comprises one or more metals.

10. (Currently Amended) The reactor of claim ~~19~~ <u>9</u>, wherein the one or more metals is selected from the group comprising copper, ruthenium, osmium, platinum, silver, nickel, rhodium, palladium, gold, and/or combinations thereof.

11. (Original) The reactor of claim 1 further comprising an ultraviolet light.

12. (Original) The reactor of claim 11, wherein the ultraviolet light is positioned within the hollow interior region of the chamber.

13. (Original) The reactor of claim 11, wherein the ultraviolet light is positioned outside the chamber.

14. (Original) The reactor of claim 11, further comprising a humidifier in communication with the first input.

15. (Original) The reactor of claim 11, wherein the catalyst nanoparticles comprise a photocatalytic material comprising at least one material selected from the group comprised of titanium dioxide, aluminum oxide, vanadium pentoxide, iron (III) oxide, zinc oxide, cadium sulfide, zinc telluride, zirconium oxide, molybdenum disulfide, tin oxide, antimony tetraoxide, cesium dioxide, tungsten trioxide, niobium pentoxide, and combinations thereof.

16. (Previously Presented) The reactor of claim 11, wherein the catalyst nanoparticles comprise a metal oxide and at least one co-catalyst.

17. (Previously Presented) The reactor of claim 16, wherein the co-catalyst comprises one or more metals selected from the group comprising copper, ruthenium, osmium, platinum, silver, nickel, rhodium, palladium, gold and mixtures thereof.

18. (Original) The reactor of claim 1, further comprising a means for agitating the catalyst nanoparticles within the hollow interior region.

19. (Original) The reactor of claim 18, wherein the means for agitating comprises a shaker device.

20. (Original) The reactor of claim 18 wherein the means for agitating comprises a vibrator.

21. (Currently Amended) A method of removing contaminants from a contaminated gas comprising:

providing a fluidized-bed reactor comprising:

a chamber defining a hollow interior region and having a lower surface;

a first input for introducing a contaminated gas into the hollow interior region, the contaminated gas comprising at least one hydrocarbon contaminant;

a plurality of catalyst nanoparticles within the hollow interior region and located on the lower surface, wherein the catalyst nanoparticles have an average particle diameter of about 15 nm to about 25 nm; ~~, and~~

a fluidizing input for introducing a fluidizing material into the hollow interior region, said fluidizing input having an outlet directed at the lower surface of the chamber,

wherein the introduction of the fluidizing material directed at the lower surface fluidizes at least a portion of the catalyst nanoparticles located on the lower surface to create a gaseous dispersion of catalyst nanoparticles that reacts with the contaminated gas to produce a decontaminated gas;

a port for the exit of the decontaminated gas out of the hollow interior region;

a second input for introducing a backpressure pulse of gaseous material into the hollow interior region through the port; and

a gas permeable separation device in communication with both the port and the second input,

introducing the contaminated gas into the hollow interior region;

introducing the fluidizing material into the chamber and directing the fluidizing material at the lower surface to fluidize at least a portion of the catalyst

nanoparticles located on the surface to create a gaseous dispersion of catalyst nanoparticles that react with the contaminated gas to produce a decontaminated gas;~~.~~

passing the decontaminated gas from the hollow interior region through the port and the separation device so that nanoparticles are collected on the separation device; and

introducing a backpressure pulse into the hollow interior region through the port and separation device so as to displace catalyst nanoparticles from the separation device; and

allowing the plurality of catalyst nanoparticles displaced from the gas separation device to join the fluidized dispersion of catalyst nanoparticles and continue reacting with the contaminated gas within the hollow interior region.

22. (Canceled)

23. (Canceled)

24. (Currently Amended) The method of claim ~~23~~ 21, further comprising the step of synchronizing the function of the second input for introducing a backpressure pulse of gaseous material into the hollow interior region to function with at least one of a group comprising the first input for introducing a contaminated gas into the hollow interior region, the fluidizing input for introducing a fluidizing material into the hollow interior region and combinations thereof, wherein the device for synchronizing prevents the simultaneous introduction of at least one of the group comprising contaminated gas, fluidizing material, and combinations thereof with a backpressure pulse of gaseous material into the hollow interior region.

25. (Currently Amended) A fluidized bed reactor system, comprising:

a fluidized-bed reactor having a chamber, a plurality of catalyst nanoparticles, a first input, a fluidizing input, a port, a second input and a gas permeable separation device, the chamber defining a hollow interior region with the plurality of catalyst nanoparticles disposed therein, each of the plurality of catalyst nanoparticles having an average ~~cross-sectional size~~ diameter within a range between about 15 and about 25 nanometers, and the first input, the fluidizing input, and the port being in communication with the hollow interior region, the first input configured to direct a contaminated gas into the hollow interior region, the contaminated gas comprising at least one hydrocarbon contaminant, the fluidizing input configured to direct a fluidizing material toward the plurality of catalyst nanoparticles for fluidizing at least a portion of the plurality of catalyst nanoparticles and creating a gaseous dispersion of catalyst nanoparticles that reacts with the contaminated gas for producing a decontaminated gas, the gas permeable separation device being in communication between the port and the second input, the port configured to direct the decontaminated gas from the hollow interior region through the gas permeable separation device such that the plurality of catalyst nanoparticles collect on the gas permeable separation device, the second input configured to direct a backpressure pulse of gaseous material through the gas permeable separation device for displacing the plurality of catalyst nanoparticles previously collected on the gas permeable separation device therefrom, and allowing the plurality of catalyst nanoparticles displaced from the gas separation device to join the fluidized dispersion of catalyst nanoparticles and continue reacting with the contaminated gas within the hollow interior region; and

at least one control device coupled to the second input and at least one of the first and fluidizing inputs, the at least one control device configured to alternate the backpressure pulse of gaseous material through the gas permeable separation device with an entrance of at least one of the contaminated gas and the fluidizing material into the hollow interior region.

26. (Previously Presented) The fluidized bed reactor system of claim 25, wherein the at least one control device is further configured to introduce the backpressure pulse of gaseous material through the gas permeable separation device for about 0.2 seconds and introduce at least one of the contaminated gas and the fluidizing material into the hollow interior region for about 0.8 seconds.

27. (Previously Presented) The fluidized bed reactor system of claim 25, wherein the at least one control device comprises at least one of a needle valve, a solenoid, a computer, a generator and a sensor.

28. (Previously Presented) The fluidized bed reactor system of claim 25, wherein the at least one control device is configured to introduce the backpressure pulse of gaseous material at a force based on at least one of a volume of the hollow interior region, a density of the contaminated gas, a concentration of the contaminated gas, a composition of the contaminated gas, a composition of the plurality of catalyst nanoparticles, an internal pressure of a contaminated gas source, a temperature of a contaminated gas source and a particle build up in the chamber of the fluidized-bed reactor.

29. (Previously Presented) The fluidized bed reactor system of claim 25, further comprising a gas permeable layer within the hollow interior region of the chamber, the gas permeable layer having the plurality of catalyst nanoparticles thereon in a non-fluidized state, and the fluidizing input being disposed 45 degrees relative to the gas permeable layer and having an outlet directed at the plurality of catalyst nanoparticles on the gas permeable layer.

30. (Previously Presented) The fluidized bed reactor system of claim 25, wherein the second input has a decontaminated gas passage way, the decontaminated gas passage way configured to receive the decontaminated gas exiting from the hollow interior region through the port and the gas permeable separation device, the decontaminated gas passage way further configured to recycle the decontaminated gas through at least one of the fluidizing inlet and the port into the hollow interior region.

31. (Previously Presented) The fluidized bed reactor system of claim 30, further comprising a flame ionization detector in communication between the decontaminated gas passage way and the fluidizing input, such that the decontaminated gas passes through the flame ionization detector to the fluidizing input.

32. (Previously Presented) The fluidized bed reactor system of claim 30, wherein the at least one control device includes a filtration device and a gauge, the filtration device in communication with a decontaminated gas passage way, the filtration device configured to collect the plurality of catalyst nanoparticles that bypasses the gas permeable separation device from the hollow interior region, and the gauge configured to generate a signal indicative of a quantity of catalyst nanoparticles that bypasses the gas permeable separation device, the signal being received by another control device.

33. (Previously Presented) The fluidized bed reactor system of claim 32, wherein the gauge is further configured to determine a pressure within the fluidized bed reactor system.

34. (Previously Presented) The fluidized bed reactor system of claim 25, further comprising a gas source coupled to at least one of the second and fluidizing inputs for providing the backpressure pulse of gaseous material and an entrance of the fluidizing material into the hollow interior region, respectively.